Claims

1. A protein complex comprising a first and second peptide, each of said peptides being joined to a heterologous helical domain, said helical domains being noncovalently associated to form an antiparallel leucine zipper.

2. The protein complex of claim 1, wherein said peptides form a signaling moiety while complexed.

3. The protein complex of claim 1, wherein said first and second peptides are joined to said helical domains via a linker.

4. The protein complex of claim 1, wherein each of the first and second peptides comprises a distinct portion of green fluorescent protein (GFP).

5. The protein complex of claim 1, wherein each of the helical domains comprises an amino acid sequence as set forth in SEQ ID NO: 1 or SEQ ID NO: 2.

6. A nucleic acid encoding a fusion protein comprising a peptide and a helical domain, said helical domain forming an antiparallel leucine zipper when it noncovalently associates with a complementary helical domain.

7. The nucleic acid of claim 6, wherein the fusion protein further comprises a linker moiety interposed between the peptide and the helical domain.

8. The nucleic acid of claim 6, wherein the peptide comprises a peptide of green fluorescent protein (GFP).

9. A fusion protein comprising a peptide and a helical domain, said helical domain forming an antiparallel leucine zipper when it noncovalently associates with a complementary helical domain.

10. The fusion protein of claim 9, wherein the fusion protein further comprises a linker moiety interposed between the peptide and the helical domain.

11. The fusion protein of claim 9, wherein the peptide comprises a peptide of green fluorescent protein (GFP).

12. A method of assembling a protein complex comprising the steps of:

(a) providing first and second helical domains that non-covalently associate to form an antiparallel leucine zipper;

(b) providing first and second peptides;

(c) producing fusion proteins by separately fusing said first helical domain to said first peptide and said second helical domain to said second peptide; and,

(d) allowing the fusion proteins to form a protein complex mediated by the non-covalent association of the first and second helical domains into an antiparallel leucine zipper.

13. The method of claim 12, wherein the protein complex comprises a signaling moiety.

14. The method of claim 12, wherein each of the helical domains comprises a leucine rich hydrophobic core.

15. The method of claim 14, wherein each of the helical domains further comprises acidic residues and basic residues.

16. The method of claim 15, wherein each of the helical domains further comprises a buried asparagine residue.

17. The method of claim 12, wherein the pair of helical domains has the amino acid sequences as set forth in SEQ ID NO: 1 and SEQ ID NO: 2.

18. The method of claim 12, wherein the step of producing the fusion proteins further comprises interposing a linker moiety between the peptide and the helical domain.

19. The method of claim 12, wherein the distinct peptides are derived from GFP.

20. A method of identifying a polypeptide that interacts with a known polypeptide comprising the steps of,

(a) producing a first fusion protein comprising the known polypeptide linked to a first GFP fragment;

(b) producing a second fusion protein comprising a test polypeptide linked to a second GFP fragment, wherein association of the first and second GFP fragments results in a GFP that exhibits detectable fluorescence;

(c) allowing the first fusion protein to associate with the second fusion protein to form a complex mediated by the non-covalent association of the known polypeptide and test polypeptide; and,

(d) detecting association of GFP, wherein association of GFP indicates that the test polypeptide interacts with the known polypeptide.

21. The method of claim 20, wherein the first GFP peptide is NGFP and the second GFP peptide is CGFP.

22. A method of identifying a polypeptide that interacts with a known polypeptide comprising the steps of,

(a) producing nucleic acid encoding a fusion protein comprising the known polypeptide linked to a first GFP fragment;

(b) producing nucleic acids encoding fusion proteins comprising a test polypeptide linked to a second GFP fragment, wherein association of the first and second GFP fragments results in a GFP that exhibits detectable fluorescence;

(c) cotransforming or cotransfecting the nucleic acids of steps (a) and (b) into a host cell for expression of the encoded fusion proteins;

(d) selecting colonies that exhibit fluorescence; and,

(e) culturing the selected colonies to identify the test polypeptides that interact with the known polypeptide.

23. The method of claim 22, wherein the first GFP peptide is NGFP and the second GFP peptide is CGFP.

24. The method of claim 22, wherein the nucleic acids of step (b) are produced in the form of a combinatorial library.

25. A method of identifying a molecule that inhibits the activity of a known protein comprising,

(a) producing a first fusion protein comprising a first known polypeptide linked to a first GFP fragment;

(b) producing a second fusion protein comprising a second polypeptide linked to a second GFP fragment, wherein the second polypeptide is known to interact with the first polypeptide and wherein association of the first and second GFP fragments results in a GFP that exhibits detectable fluorescence;

(c) allowing the first fusion protein to associate with the second fusion protein to form a GFP complex mediated by the non-covalent association of the first and second polypeptide;

(d) incubating a test molecule with the GFP complex; and,

(e) detecting disassembly of the complex, wherein disassembly of the complex indicates that the test molecule inhibits the activity of the known protein.

26. The method of claim 25, wherein the first GFP peptide is NGFP and the second GFP peptide is CGFP.

27. A method of detecting protein-protein interaction comprising,

(a) producing a first fusion protein comprising a known polypeptide linked to a first GFP fragment;

(b) producing a second fusion protein comprising a test polypeptide linked to a second GFP fragment, wherein association of the first and second GFP fragments results in a GFP that exhibits detectable fluorescence;

(c) allowing the first fusion protein to associate with the second fusion protein to form a complex mediated by the non-covalent association of the known polypeptide and test polypeptide; and,

(d) detecting reassembly of GFP, wherein reassembly of GFP indicates that the test polypeptide interacts with the known polypeptide.

28. The method of claim 27, wherein the method further comprises obtaining nucleic acids encoding the first and second fusion protein and cotransfecting or cotransforming the nucleic acids into a cell to obtain the first and second fusion protein.